

COPTIS TRIFOLIA AND ITS EASTERN AMERICAN REPRESENTATIVE

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THE little evergreen herb known as *Coptis trifolia* (L.) Salisb. has been reputed to occur in three quite separate areas of the northern hemisphere: (1) southern Greenland and Labrador to Manitoba, south to New Jersey, Pennsylvania, the mountains of North Carolina and Tennessee, northern Ohio, northern Illinois and northern Iowa; (2) Alaska and adjacent northern British Columbia westward across eastern Siberia and south to Japan and Manchuria; (3) Iceland, Norway and central Russia. Such a completely disrupted range indicates long isolation of the three reputed areas. It has, consequently, seemed worth while to study *Coptis trifolia* with some care, to see if it has remained essentially constant throughout its whole range.

The first embarrassment arises from the fact that, although in the Gray Herbarium there is very abundant material from northeastern America and Greenland and a satisfactory series from Alaska and northeastern Asia, there is absolutely nothing to show for the plant from Europe. It has, accordingly, been necessary to investigate the bases of its European records. The report of *Coptis trifolia* from Iceland seems to have started in 1774 when Murray in L. Syst. ed. 13, emend. Murr. 432 (1774) appended to the description of *Helleborus trifolius* L. and a citation of Oeder's plate in Flora Danica of the Greenland plant the note "*Etiam in Islandia.*" Later students of the Iceland flora have repudiated this record. For instance, Hornemann, Fl. Dan. ix. fasc. xxvi. 3, t. mdxix (1816), referred to the plant as growing in Danish territory only in Greenland; Lange, in 1887, in his Nomenclator "*Florae Danicae*" (covering all Scandinavia as well as Iceland and Greenland) enumerated it (p. 165) only from Greenland; and it is not even mentioned in the detailed Icelandic floras of Hjaltalín (1830), Grønlund (1881) and Stefánsson (1901).

The records from Norway are, likewise, very unsatisfactory. In 1817, DeCandolle, describing *Coptis trifolia*, gave the range: ". . . regionum Borealium, nempè in Islandiâ (Oed.), Norwegiâ (Gun.), Groenlandiâ, Horn. Sibiriâ," etc.¹ In the place cited

¹ DC. Syst. i. 322 (1817).

by DeCandolle, however, Fl. Dan. iv. fasc. x. 5, t. dlxvi. (1770), Oeder made no mention of Iceland, saying clearly "Locus. In Groenlandia"; and in Gunnerus, Flora Norvegica, pt. 2: 139, no. mlxvi. cited by DeCandolle as the basis for the plant in Norway, we find: "Norv. *Nordsimmer*. In grönlandia." "*Nordsimmer*," which DeCandolle apparently mistook for a locality in Norway, was, of course, the Norwegian name assigned by Gunnerus to the plant, just as in the two species immediately following it (and in all others) Norwegian names were given by Gunnerus: *Ledum groenlandicum*, "Norv. *Grönlandsk Thé*. Anglorum *Labrador-thé* . . . Habitat in grönlandia"; and *Scilla bifolia*, "Norv. *Faeröisk Hyacinth*. In insulis faeröensibus." In 1893 another record of *Coptis trifolia* from Norway was published by Dr. Ernst Huth: "Europa: Islandia (ex LINNÉ [meaning Murray] syst. ed. XIII sed dubia aliis testibus), Norvegia (H I V!), Rossia media (teste LEDEBOUR)."¹ The reference "Norvegia (H I V!)" was to a specimen in the Imperial Herbarium at Vienna; but in view of the facts, that *Coptis* is not admitted as a Scandinavian plant by such thorough students of the Scandinavian flora as Blytt, Fries, Hartman, Lindman and Norman, and that the Norwegian record by Huth was wholly ignored by Gürke in his *Plantae Europaeae*, ii. 419 (1903), it is a fair assumption that Huth's record involves some error. That the earlier Norwegian record of DeCandolle was based on error has been made clear.

Huth's basis for *Coptis* in Russia was Ledebour, *Flora Rossica*, i. 53 (1841); and Ledebour's statement, though detailed, was wholly based on records in literature by Pallas and by Lepechin: "Hab. in Rossia media [pr. Sarapul Gub. Wiätka (PALL.), Kasan (LEPECH.)], in part. bor. jugi Ural (PALL.)." These localities are definite and the early records were circumstantial, as, for instance, when Pallas, writing in 1773 of his travels in Wiätka, said "Ich kam den 7ten April nach Sarapul zurück. Der Schnee war schon in freyen Gegenden ganz verschwunden und man sahe den Huflattich und am 9ten April unter den Gebüsch den häufigen *Helleborus trifolius* mit Blumen hervor kommen";² or again when, in describing the arctic and subarctic region, Samojeden, between the northern Ural and the mouth of the Ob, Pallas enumerated the plants: "Ich muss beym Beschluss diese Reise ein Verzeichniss der Pflanzen,

¹ E. Huth, Engler's Bot. Jahrb. xvi. 302 (1893).

² Pallas, Reise, iii. 485, 486 (1776).

welche in den arktischen Wüsteneyen gesammelt worden sind, . . . *Salix myrtilloides, herbacea, lapponica, . . . Arbutus alpina* [*Arctostaphylos alpina*] und *Empetrum nigrum, . . . Saxifraga cernua, rivularis, bronchialis* und *nivalis; Dryas octopetala, . . . Veronica alpina; . . . Andromeda hypnoides [Cassiope]; . . . Rubus arcticus, Helleborus trifolius;*" etc.¹ The most significant feature of the reports of *Coptis trifolia* in European Russia and western Siberia is the fact that Ledebour, two-thirds of a century after Pallas and Lepechin, could find no other evidence than their statements for the plant so far west in Eurasia; and that Huth, monographing the group more than a half-century later, should still rely solely on the unsupported statements of Pallas and of Lepechin. As to the occurrence of *Coptis trifolia* in the arctic flora of Samojeden, it may be noted that *Ranunculus lapponicus* L. superficially strongly simulates *Coptis trifolia* and is particularly similar to the crude illustration of the latter plant published by Linnaeus in 1751, the only illustration available to Pallas and to Lepechin; and *R. lapponicus* is well known from the Samajeden region, although Pallas did not list it. Ledebour, Fl. Ross. i. 36 (1841), cited *Ranunculus lapponicus* as growing in "terrae Samojedarum regione sylvatica et subarctica (SCHRENK *in litt.*)" and an excellent sheet of Schrenk's collection is before me. Ruprecht, Flores Samojedorum Cisuralensium, 18 (1846), enumerated *R. lapponicus* but not *Coptis trifolia*; and, similarly, Sommier, in his Flora dell 'Ob Inferiore, 58 (1896), listed *R. lapponicus* "In sphagnosis humidis tundrae et sylvarum haud frequens," but did not mention *Coptis*. Incidentally, the date, April 9th, when Pallas reported finding *Helleborus trifolius* flowering, would be amazingly early for the plant of northeastern Asia and Alaska. The flowering specimens of the latter in the Gray Herbarium were all collected in May, June and July, and at the extreme southern limit of the species, in Japan, it is said to flower in June and July.² It seems most reasonable, therefore, to infer that the old records of Pallas and of Lepechin, of *Coptis trifolia* as a Russian plant were based on misidentifications. This conclusion has been independently reached by Hultén who says: "The plant was reported from Europe (Iceland, Norway, central Russia) by LEDEBOUR and HUTH and after them by other authors. These reports must certainly be

¹ Pallas, l. c. 33, 34 (1776).

² Miyoshi & Makino, Pocket-Atl. Alp. Pl. Jap. ed. 2, i. 13 (1907).

regarded as erroneous and are probably due to confusion of synonyms and labels.¹

When the plants of the two veritable areas, of Atlantic North America and Greenland (*Anemone groenlandica* Oeder) and of northeastern Asia and Alaska (true *Coptis trifolia*) are compared, several important distinctions at once appear. Superficially, to be sure, the two are so similar as to have passed unchallenged as one species, but in technical characters the flowers and fruits are quite distinct. The contrasts between the two may best be displayed in tabular form.

COPTIS TRIFOLIA (L.) Salisb. (THE PLANT OF NORTHEASTERN ASIA AND ALASKA)	ANEMONE GROENLANDICA Oeder (THE PLANT OF NORTHEASTERN AMERICA AND GREENLAND)
Petioles of the larger leaves 2–15 cm. long, $\frac{1}{5}$ – $\frac{1}{2}$ the length of the middle leaflet.	Petioles of the larger leaves 1–10 cm. long, $\frac{1}{4}$ as long to as long as the middle leaflet.
Leaflets sessile or barely petiolulate.	Leaflets petiolulate.
Sepals narrowly to broadly oval, 2–4 mm. broad, abruptly clawed, rounded or obtuse at tip.	Sepals spatulate, oblanceolate or elliptic-lanceolate, 1–3 mm. broad, gradually narrowed to base, without claw, obtuse to subacute.
Blade of petal usually rhombic and as long as broad.	Blade of petal usually rounded-obovate and broader than long.
Carpels 1–7 (usually 3 or 4); the body of the mature follicle 3.5–5 mm. long, with beak (style and stigma) 1.5–2.5 mm. long.	Carpels 3–9 (usually 5 or 6); the body of the mature follicle 5–9 mm. long, with beak 2.5–4 mm. long.
Seeds densely crowded, completely filling the follicle, quadrate in cross-section.	Seeds not crowded, about half-filling the follicle, rounded in section.

From the above analysis it is apparent that, although very closely related, the eastern Asiatic (and Alaskan) plant and the eastern American (and Greenland) plant have quite definite individual tendencies, the Asiatic inclining to proportionately longer petioles, essentially sessile leaflets, broader rounder-tipped sepals with definite claw, more rhombic petals, fewer carpels, smaller follicles, shorter beaks and more crowded and somewhat quadrate seeds; the eastern American with petioles averaging shorter, the leaflets definitely petiolulate, the sepals narrower and without claw, the petals with

¹ Hultén, Fl. Kamtschatka and Adj. Isl. ii. 102 (1928).

more dilated blade, the carpels usually more numerous, the follicles larger and longer-beaked, and the less crowded seeds not quadrate. Completely isolated as they are, they constitute two very strong geographic varieties or, presumably, two distinct species. Until more transitional material than we yet know comes to hand it seems more reasonable to treat them as two species, which, however, may eventually be merged.

Coptis trifolia (L.) Salisb. Trans. Linn. Soc. viii. 305 (1807) went back to *Helleborus trifolius* L. Sp. Pl. ed. 2, 784 (1762). Linnaeus there gave only a brief account:

trifolius. 5. HELLEBORUS scapo unifloro, foliis ternatis. *Amoen. acad.*
2. p. 356. t. 4. f. 18. *Kalm. it.* 3. p. 379.
Habitat in Canadae, Siberiae *sylvis nemorosis cum Oxalide,*
Circaea.

This account was as thorough a blending of the references to the eastern Asiatic and the eastern American plants as could be imagined. The only descriptive phrase and the citation *Amoen. Acad.* go back to the description by Linnaeus's pupil, Halenius, in his thesis, *Plantae Camschatcenses Rariores*, *Amoen. Acad.* ii. 356 (1751) and illustrated by t. 4, fig. 18; Linnaeus in 1762 merely transposing the order of his descriptive phrases. The second reference in 1762, to Kalm, was obviously to the Canadian plant, as were also the statement of habitat and of association of the plant with *Oxalis* and *Circaea*. In his journal of August 13, 1749 at Lorette, Quebec, Kalm said (I quote from the later English ed.): "The three-leaved Hellebore (*Helleborus trifolius*) grows in great plenty in the woods, and in many places it covers the ground by itself. However, it commonly chooses mossy places, that are not very wet; and the wood-sorrel (*Oxalis Acetosella*, Linn.), with the *Mountain Enchanter's Nightshade* (*Circaea alpina*, Linn.) are its companions."¹ In 1762, when he formally published the binomial *Helleborus trifolius*, Linnaeus used the diagnosis originally given in 1751 for the Kamtchatkan plant alone and his (or Halen's) original description of the latter was very detailed:

18. HELLEBORUS foliis ternatis, scapo unifloro. *Fig. 81* [18].
RADIX fibrosa, filiformis, repens, perennis.
FOLIA radicalia ternata: *Foliolis* sessilibus, obverse ovatis, extrorsum magis
gibbis, argute serratis, rigidiusculis, glabris, venosis. *Petioli* filiformes,
folio longiores.

¹ Kalm, *Travels into North America*, trans. Forster, iii. 160, 161 (1771).

SCAPUS solitarius, filiformis, petiolis duplo longior, instructus *Bractea* subovata.

FLOS solitarius, magnitudine floris *Trientalis*.

COROLLAE *Petala* quinque, ovata, basi in unguis attenuata, alba, striata, *fig. a.*

Nectaria petalis saepius plura, lutea, limbo ovata, basi attenuata in cylindrum perforatum, petalis dimidio breviora.

STAMINUM *Filamenta* capillaria, alba, plurima nectariis vix longiora. *Antherae* albae, subrotundae, erectae. *fig. b.*

PISTILLI *Germina* quinque compressa. *Styli* filiformes, longitudine staminum, recurvi. *Stigmata* obtusa. *fig. c.*

PERICARPIUM *Capsulis* quinque, acuminatis, compressis, coadunatis margine interiore.

SEMINA plurima.

*Minima est haec planta in suo genere, attamen spectabilis; inter Flores Sibiriae speciosos & maxime singulares est etjam quaedam Fumaria bulbosis affinis, floribus condecorata, in suo genere maximis.*¹

This original account of the Kamtchatkan plant, illustrated by a characteristic figure² and clearly defining the distinguishing characters (“*Foliolis sessilibus*,” “COROLLAE *Petala* [Linnaeus called the sepals petals and the petals nectaries] ovata, basi in unguis attenuata,” “*Nectaria* . . . limbo ovata”), must be taken as the true basis of *Helleborus trifolius* and consequently of *Coptis trifolia*; and it is necessary to find the proper name for the plant of northeastern America and Greenland. Fortunately, this is not difficult. Our plant was described and illustrated as “*Anemone, groenlandica, foliis ternatis serratis, scapo unifloro nudo. Locus. In Groenlandica*” by Oeder, *Flora Danica*, iv. fasc. x. 5, t. dlxvi (1770). The binomial,

¹ Halen's thesis, defended before Linnaeus and others at a public examination at Upsala, December 22, 1750, is of more than usual interest, for in it (§ V) he pointed out, probably for the first time, the similarity of the floras of eastern Asia and eastern America: “& denique quasdam etjam cum Canadensibus easdem, argumento Canadam a Camschatca non longe distare, uti sequentes antea in sola America boreali visae nunc etjam in extrema ora Sibiriae: sicut.” Then followed an enumeration, including “CLAYTONIA foliis linearibus,” i. e. *C. virginiana* L. of eastern America paired with *C. arctica* Adams of northeastern Asia; “ANEMONE caule dichotomo, foliis sessilibus amplexicaulibus palmatis,” the eastern Asiatic *A. dichotoma* L. and the eastern American *A. canadensis* L., formerly treated as a single species; “PARIS foliis ternis, flore pedunculato erecto,” *Trillium camtschaticum* Pallas and other eastern Asiatic species similar to *T. erectum* L. and other eastern American species; and eight other genera, ending with “SWERTIA corollis quadricornibus,” i. e. *Halenia*—the genus named by Borchkausen for Halen—with the Siberian *H. corniculata* (L.) Druce very close to the eastern American *H. deflexa* (Sm.) Griseb., which were long treated as a single species.

² In the original figure the leaves were shown as deeply 3-lobed, not 3-foliolate, consequently Lamarck, *Encycl. Meth.* iii. 98 (1789), altered the name to *Helleborus trilobus*. Salisbury, too, prior to his publication of *Coptis*, disliking the specific name, altered it (without nomenclatural authority) to *H. pumilus* Salisb. *Prodr.* 374 (1796); and Rafinesque transferred *H. trifolius* to a proposed new genus (published without a word of differentiation) as *Chrysa borealis* Raf. *Med. Repos. Hex.* ii. v. 352 (1808) and *Chrysa borealis* Raf. *Desv. Journ. Bot.* ii. 170 (1809).

Anemone groenlandica, has always been ascribed to Oeder as published at this time; but recently there has been doubt as to whether Oeder really intended at this time to use binomials. Slightly later, however, Gunnerus, *Fl. Norvegica*, pt. 2: 139 and in index (1772) took up *Anemone groenlandica* as a definite binomial, referring directly back to Oeder's original publication; and in the preface to this part and, especially in the introduction to the 1st part (1766), Gunnerus made it clear that he intended the first two names of his descriptions as true binomials. These names and descriptions of Oeder were taken over unchanged by Gunnerus, who, by his clear explanation of them as binomials and his indexing of them as unequivocal binomials, definitely validated them. The plant of northeastern America and Greenland, treated, at least for the present, as a species must be called, then

COPTIS **groenlandica** (Oeder), n. comb. *Anemone groenlandica* Oeder, *Fl. Dan.* iv. fasc. x. 5, t. dlxvi (1770); Gunnerus, *Fl. Norveg.* pt. 2: 139 and in index (1772). *Helleborus triolius* L. *Sp. Pl.* ed. 2, 784 (1762), as to Canadian plant only, not *H. foliis ternatis* L. *Amoen. Acad.* ii. 356, t. 4, fig. 18 (1751). *C. trifolia* Salisb. *Trans. Linn. Soc.* viii. 305 (1807), in part only.

GRAY HERBARIUM.

SOME INTERESTING PLANTS FROM MT. KATAHDIN.—During a trip to Mt. Katahdin, Maine, last summer, the writer collected the following plants, not previously reported from the mountain.

LYCOPODIUM CLAVATUM L. var. MONOSTACHYON Grev. & Hook. The short-spiked, short-stalked variety was found at the head of the Saddle Slide. The only other station in New England for this variety is on Mt. Washington.

STREPTOPUS OREOPOLUS Fernald. Abundant on damp slopes above timber line in both the North and South Basins. The first record from Maine.

EPILOBIUM PALUSTRE L. var. LABRADORICUM Haussk. Damp gully, North Basin. Known elsewhere in New England only from Mt. Washington.

LEDUM GROENLANDICUM Oeder. All specimens of *Ledum* collected proved to be this species, although careful search was made, particularly about Monument Peak, for *L. palustre* L. var. *dilatatum* Wahlenb. Professor Fernald, on re-examination of the single specimen in the Gray Herbarium, collected by Thurber, which is the only basis for the record of the latter species from Mt. Katahdin in Gray's